Next Generation Sensor Network Solutions for Offshore Oil and Gas Operations

Internet of Things – A Good Investment While Prices Are Low
Big Data and the Future of Oil
How Internet of Things Technology is Revolutionizing Offshore Oil
New Software for a New Age
Converging Technologies Make for an Exciting Future
No More Hide & Seek
Oil Rig Asset Tracking

Losing track of a critical asset can bring operations on your oil rig to a grinding halt. That’s why being able to track asset location at all times is so valuable. With Mojix wide-area sensor networks and IoT platform solutions you can manage logistics across your entire supply chain, improve safety and mitigate operational risk—all with one flexible infrastructure.

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Foreword

The offshore industry is at a crossroads. The world still contains enough oil to last for decades, but there’s no guarantee it will be able to tap all these resources. Money is tight. Exploration is expensive. If offshore oil companies are to survive, they will have to find a way to balance these conflicting demands. How? Increasingly it looks as if the critical factor of the next few years will be the way in which the industry makes use of data.

The industry is collecting more information than ever before. Doing so allows them to make savings, improve production, maintain safety and conform to more stringent environmental regulations. In the first article in this report, we hear from Mojix Inc., one of the leading names in this space. They outline the different technologies coming to market which are revolutionizing the way the industry does business. We will then look more closely at the growing role of data in the oil industry. We are in the age of big data – with rigs becoming more automated and connected than ever before. The convergence of multiple technological advances is opening the door to numerous improvements which can place the more proactive companies at a crucial competitive advantage.

Tom Cropper

Internet of Things – A Good Investment While Prices Are Low

Scot Stelter, Sr. Director, Product Marketing - Mojix, Inc.

Investments in IoT will give firms a competitive advantage when prices snap back.

Crude Prices Put Capex Budgets Under Pressure

In a contributed article in Forbes online edition on May 29th a market analyst firm predicted that the price of Brent crude would average $75 per barrel over 2015, with a target of $85 within 18 months. The price had been idling around $70 for several weeks, and the analysts said supply reductions would lead to price increases. The rationale made sense, but not the timing, as the price has declined since, touching $43 lately. While futures traders expect that prices will recover, because producers are unwilling to risk market share with significant production cuts, and demand is rising slowly in OECD2 countries, the consensus is that it will take 2-3 years before the price rises above $80 again. In preparation, many are deferring projects, pressuring suppliers, reducing R&D and trimming CapEx budgets.

Don’t be in Second Gear When Prices Snap Back

But now is not the time to cut back on investments in operational excellence, say many analysts, including Bain and Company. “Short-term cost cuts may deliver immediate relief, but the wrong cuts can threaten the balance of safety, reliability and cost leadership... Operational excellence allows oil and gas leaders to confidently say and prove that they are running their assets safely, reliably, sustainably and cost-effectively.”

One interpretation is that no one can afford to be in second gear when, as Alger energy analyst Eric Richards put it, “a snapback in prices” comes “once supply and demand equilibrium is reached.” The prescription? Firms should use this period to invest in competitive advantage in the form of operational excellence.

Internet of Things Solutions Foster Operational Excellence and Competitive Advantage

Among the more promising investments firms are making is in applications of the Internet of Things (IoT). IoT solutions enhance and exploit the flow of data from the edge of the business, where the activity is, to where managers make decisions at the site, functional or corporate level.

<table>
<thead>
<tr>
<th>Category</th>
<th>Benefits</th>
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<tbody>
<tr>
<td>People</td>
<td>• Crew safety on rigs and at construction sites&lt;br&gt;• Coordinated emergency response&lt;br&gt;• Reduced liability and insurance&lt;br&gt;• Accountability</td>
</tr>
<tr>
<td>Supply chain</td>
<td>• Construction schedule predictability&lt;br&gt;• Lean and synchronized supply chain&lt;br&gt;• Reduced storage &amp; financing costs&lt;br&gt;• Reduced expecting &amp; penalty costs</td>
</tr>
<tr>
<td>Assets</td>
<td>• Improved return on capital&lt;br&gt;• Timely MRO, up-to-date ratings &amp; certifications&lt;br&gt;• Verified use/invoking for leased assets&lt;br&gt;• Faster return of leased and pooled assets</td>
</tr>
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FIGURE 1: CATEGORIES WHERE THE IoT ENHANCES OPERATIONS FOR OIL AND GAS FIRMS

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Though lately layered in hype, the IoT is quite real and hardly new. British Petroleum has been using sensors to observe the characteristics of oil as it comes out of the ground to assess the real and hardly new. British Petroleum has been using sensors to observe the characteristics of oil as it comes out of the ground to assess the

### 1. Crew tracking system for barges and rigs ensures effective emergency response

A Gulf-Coast equipment supplier provides oil companies with specialized equipment to support drilling and production. Among the many items leased are subsea trees similar to the one shown in Figure 5. Prior to implementation of the system, upon return by a lessee, equipment was manually received and laid down in a yard until needed again. As a result of this

2. Supply chain tracking system synchronizes material delivery during rig construction to reduce construction costs and avoid schedule penalties

The data generated by the RFID sensors flows into a cloud-based system that provides both tabular and graphical reports on the location of shipments en route. Once goods have arrived they go into a warehouse where a passive, RFID-based real-time location system (RTLS) locates them to within a 3-meter radius, ensuring quick access when requisitioned by the factory. An example of how this might look to a user is shown in Figure 4. When the factory requisitions material from the warehouse, the transfer of the material is recorded by the system, triggering actions in MES, WMS and accounting systems.

3. Oil equipment supplier tracks assets to maximize return on capital and ensure proper maintenance and certification for safe use at the rig site

The right IoT platform can be used to implement all of these use cases. Here’s a rundown of what’s important in selecting an IoT platform:

- **User-configurability**
- **Scalable support for big data**
- **Designed for seamless integration**
- **Security**
- **Complex event processing (CEP)**
- **Rules-based support for workflow and machine-to-machine (M2M) communications**

User-configurability enables the system to deliver value faster, scale easily and evolve rapidly with less cost. Complex technology deployments rarely hit the mark perfectly at deployment. As the new system is understood and requirements evolve, changes are required. But reading to these learnings often requires custom software work, and money to pay for it. The ideal IoT system will maximize the ability for users to optimize the system without code.
Systems that meet these characteristics make it possible to implement cost-effective solutions that enhance operational excellence, leading to confidence that you’re operating your assets safely, reliably, sustainably and cost-effectively.

Multi-tenancy support with tenant group hierarchy (TGH) simplifies fitting the system to the business

Multi-tenancy is familiar to those who use cloud services or software as a service (SaaS) offerings. But multi-tenancy also has applicability in complex deployments with multiple sites or facilities – multiple oil rigs for example – where separation of data between facilities is important. Multi-tenancy needs to be hierarchical – that is, it works up/down the organization, between companies, facilities, departments and teams. For a given tenant, the settings for security, data separation, business rules, integration options, localization, etc. need to be inherited – and over-ridden – down the hierarchy. For example, security settings for the organization might be set at the top and maintained consistently down the line, but business rules might be different for a barge and a deepwater rig, or two down the line, but business rules might be different for a barge and a deepwater rig, or two

Scalable big data means costs are under control as the system grows with the business

An IoT system should easily scale with data volume. Look for systems that support:
• Linearly scalable data storage, typically implemented in the cloud. This means that the dataset can grow indefinitely, and the cost of added storage grows no faster than the data volume
• Storage for unstructured data sometimes inaccurately referred to as a “noSQL” database. This is where sensor data streams in real time, and from where it can be retrieved later
• A traditional data warehouse – as unstructured data is interpreted and translated into recognizable business events, those events are stored in traditional databases holding traditional “structured” data that is accessible by higher-level systems

Designed for seamless integration means lower costs now and ongoing

A modern system will support non-proprietary standards-based interfaces that enable rapid development of scalable, web-based interfaces. Application programming interfaces (APIs) based on Representational State Transfer or “ReST” are a good option because they can communicate using the familiar and ubiquitous HTTP protocol as web browsers do. Well-chosen interfaces lead to more maintainable, higher-performing architectures.

At the level of the physical interface with edge sensors, standard IoT device protocols such as MQTT provide a lightweight communications mechanism that tolerates intermittent wireless communications.

The rules engine should have a direct connection to external APIs – data or schedule-driven events should be able to trigger external actions not only in both modern business systems such as SAP and SFDC, but also legacy systems such as mainframe job control language and batch.

Security protects people, assets and investment

Security should be addressed on three levels:
• Inter-process communications – Internet Transport Layer Security (TLS) with strong encryption for access of systems across the internet.
• Intrusion – vulnerability and penetration testing based on a comprehensive test plan such as defined by the Open Web Application Security Project (OWASP)
• Sensor/device communications – Security between sensors and the IoT platform

Complex event processing (CEP)

Complex event processing is the drawing of inferences from one or more data streams coming from sensors by performing intensive computation and manipulation of the data. Such an engine might use windowed time series analysis, pattern matching, comparison of multiple streams and other methods to derive meaning from binary data flowing from sensors. Esper is an example of open source software that performs many of these functions and might be leveraged by an IoT platform vendor. CEP should be driven by user configurable rules.

Rules-based support both for workflow and local, machine-to-machine (M2M) action

This events recognized by the CEP engine may need to trigger a variety of responses. A good IoT system provides rule-based mechanisms for associating actions with events both as workflow and as M2M. Workflow is typically routed through the core system, but M2M often is intolerant of communications latency and interruptions. For this reason a good IoT system supports rules at the edge as well as in the cloud.

Using the oil rig crew safety example above, if a crewmember does not appear at the muster point, rules might trigger these actions:
• The crewman’s avatar on the graphical representation of the rig turns red
• A text notification is sent to the safety officer
• The local edge box turns on a red strobe light at the last known location (M2M)
• The event severity code is escalated in the on-shore control room

Needless to say, all of these rules should be configurable by the user so that they can evolve with the business without the expense and delays of additional code development.

Systems that meet these characteristics make it possible to implement cost-effective solutions that enhance operational excellence, leading to confidence that you’re operating your assets and your teams safely, reliably, sustainably and cost-effectively.

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2 Signatories to the Convention on the Organisation for Economic Co-operation and Development
6 The names of the companies deploying these solutions have been omitted to comply with confidentiality obligations. Please contact Mojix Inc. at info@mojix.com for more information about the applications.
7 MRO: Maintenance, repair and operations
8 Radio frequency identification
9 MES: manufacturing execution system; WMS: warehouse management system
Big Data and the Future of Oil

Tom Cropper, Editor

Why big data is increasingly central to the success and operation of an oil and gas rig.

Finding and extracting oil is operationally challenging and economically risky – never more so than now. Oil is becoming harder to extract. In existing fields, operators are relying on increasingly sophisticated extraction techniques while new and more extreme fields are being explored and tapped. These inevitably bring an associated increase in the challenge, risk and cost of exploration and production. Moreover, all this comes at a time when the oil price is hardly in its most robust state. So at a time when the commercial proposition of extracting oil is under pressure, the cost of getting it out of the ground is growing. The industry needs cheaper, and more cost effective methods of production. Big data will play an important role in all these aims.

The Big Price Crash

The price fluctuations within the oil and gas industry have caught almost every expert by surprise. Early in 2014 predictions for the future of the offshore industry were optimistic. Prices stood higher than $100 per barrel and with a global economic recovery expected, demand was forecast to increase. However, this never happened. Throughout 2014 forecasts were progressively slashed as the recovery failed to materialize. The rise of US shale contributed to a glut of supply and, when OPEC refused to slash production in order to sustain the global price, the market went into meltdown.

The oil price crashed by more than 50%, eventually bottoming out close to $40 per barrel. Even then many analysts were reasonably bullish, placing their bets on a strong recovery. Although that appeared to have arrived in the early part of 2015 as prices rebounded to around $60 or $70, a crisis in the Chinese stock market sent prices tumbling once again. In time, analysts expect prices to recover – it’s simply taking a little longer than expected. The question for major oil and gas companies is: how should they react to this new environment? The instinctive reaction is to cut expenditure. In March 2015, Shell announced job cuts in the North Sea. By then BP had also cut jobs. However, deep sea exploration is a long term venture. Even with a depressed price, offshore drilling remains an important and viable proposition over the longer term. The question is: do drilling companies contrast to weather the storm or invest to ensure they are in the strongest position when prices rebound?

The Role of Data

In addressing their challenges, one of the biggest issues is the way in which companies use data. The industry has been collecting information via sensors across the span of rig operations for many years. They are collecting information on the make-up of hydrocarbons allowing companies to find out more about the nature of the oil and the lifespan and productivity of the oil rig. Downhole sensors can detect flow rates and condition within pipelines. They can identify corrosion rates and monitor the condition of infrastructure. The net result is the amount of data – as well as the cost of oil exploration pushes further into the depths, the amount of data – as well as the cost of extraction – increases exponentially. Harvesting this and presenting it in a coherent manner, plays an important role in the profitability of an oil field.

Production: Oil companies are collecting a vast array of data on flow rates, composition, the state of infrastructure, corrosion and much more. All this can help them maximize the production process, manage maintenance more effectively and avoid failure of equipment. As oil exploration pushes further into the depths, the amount of data – as well as the cost of production – increases exponentially. Harvesting this and presenting it in a coherent manner, plays an important role in the profitability of an oil field.

Workforce management: Improved data on the location and flow of workers on board a rig enables operators to improve work efficiency – and more importantly – improve safety. It helps in the transfer of workers from supply ships and onto rigs, and it enables faster and safer processing of evacuations. This is one area in which the oil and gas industry has been relatively slow on the uptake. Such data is viewed as being the reserve of other, softer industries. For example, data which shops use to track visitor movements can also help rig operators to identify bottlenecks, improve movement around the rig and facilitate fast and safe evacuation.

The industry is undergoing a period of change in the way it sees data. As it pushes further into deep waters, the cost of oil production is growing, as is the amount of data it can collect. Identifying ways in which the industry can collect and process data will play an important role in how it performs now and in the future.

Locating oil: Discovering oil is a difficult business. Shell recently launched an exploration in the Arctic to tap what they hoped would be vast potential resources. However, the mission ended without success. Exploratory holes yielded no oil. Reducing the need for exploratory drilling can cut costs significantly. This does require an enhanced view of seismic data. Technology has advanced significantly in this area with the advent of 3D seismic data, which produces an enhanced view of the reservoir. Managing this data is a significant challenge – billions of data points consisting of different types of information in different scales. Making this coherent and intelligible in one easy space is challenging.

Producing oil: Oil companies are collecting a vast array of data on flow rates, composition, the state of infrastructure, corrosion and much more. All this can help them maximize the production process, manage maintenance more effectively and avoid failure of equipment. As oil exploration pushes further into the depths, the amount of data – as well as the cost of extraction – increases exponentially. Harvesting this and presenting it in a coherent manner, plays an important role in the profitability of an oil field.
How Internet of Things Technology is Revolutionizing Offshore Oil

Jo Roth, Staff Writer

As data plays an increasingly important role in offshore oil and gas production, the moment has come for the Internet of Things.

There will be a clear difference between those companies which are able to adapt and turn technology to their own advantage, and those which remain stuck in the past.

The rise of IoT

The concept behind IoT technology is to create a network of physical objects embedded within sensors, software and electronics which enable information to be gathered and shared, to expedite the decision-making process.

As data plays an increasingly important role in offshore oil and gas production, the moment has come for the Internet of Things. It opens up the information to engineers and analysts who can make use of it to make important adjustments, which benefit the entire operation.

Historically, the industry has been impeded in the amount of information it can gather. A new buzzword has entered the lexicon of the oil and gas industry over the past few years – the Internet of Things ( IoT).

The speed with which oil and gas companies get to grips with this will be key in how they fare over the coming years and decades.

The rise of IoT

The concept behind IoT technology is to create a network of physical objects embedded within sensors, software and electronics which enable information to be gathered and shared, to expedite the decision-making process.

When used effectively, it can deliver telling benefits to the industry. An example of IoT technology can be seen in Alaska where Hilcorp Energy’s rig runs 24 hours a day. In some of the more inhospitable climates the industry is likely to face. Equipment faces rough seas, toxic and corrosive chemicals and extreme cold. Failure of equipment can cost hundreds and thousands of dollars. For example, Hilcorp estimates that a failure of its pumps could cost the company up to $300,000 a day in lost production – that doesn’t even factor in repair and replacement equipment costs.

To monitor production, therefore, the company uses sensors throughout the pumping system which are then fed into the Microsoft Azure Cloud, from where data is pushed to engineers working on digital dashboards who are able to monitor the pump’s health and performance. Problems can be identified and rectified swiftly.

“Last time we had a well trip offline, within five minutes we had a phone call telling us what broke, what to look at, and how to test it,” Hilcorp’s facilities engineer Mark McKinley says. “It saved six hours of troubleshooting or more, and we got right back online. The staff is ecstatic, because they get support before they have to break out manuals and figure it out on their own.”

Elsewhere, BP has teamed up with GE to connect its oil rigs to the internet. Six hundred and fifty of its wells will use up to 30 sensors to gather data, well flow and other information. This information can be analyzed in real time and uploaded to the Cloud where trained engineers can make further analysis. This information can be used by BP to predict well flows, plan extractions, identify issues and prevent downtime.

Depending on how this project fares, the company says it plans to roll it out across all its wells 15 years around the world.

IoT and the Oil Field of the Future

The IoT concept feeds into the wider notion of the digital oil field in which automation and connectivity drive greater efficiency savings and operational improvements. Such gains are vital if oil companies are to make the giant leap in performance required to maintain profitability in a cash constrained environment. None of this is entirely new. The Digital Oil Field has been around as a concept since the 1980s. It is only now that the technology is coming together to deliver truly transformative functionality in the oil and gas sector.

A report by SAP highlights that IoT technology can be used across oil and gas operations in areas such as connected fueling, asset management and tracking, and monitoring remote services. However, the report goes further and suggests it can also be used in allowing companies to push back the boundaries of exploration and production even further than they have already.

“The Internet of Things (IoT) will touch nearly every area of O&G operations and customer engagement,” it states. “With IoT, the O&G industry could tap the utility of autonomous vehicles to explore, develop, and produce under the Arctic ice pack, IoT could help optimize injection and production across horizontal well completions for maximum recovery of original oil in place.”

The possibilities appear to be as limitless as the imaginations of sales people in this field. Even so, there are problems to be ironed out. A key issue is the connection between the sensor networks and the analytics software used to evaluate gathered data. The more advanced IoT technology becomes the more information it will be capable of creating. However, the key to its success will be the way in which all that information is processed. It needs to be presented in a way which opens up the information to engineers across the company and enables prompt and timely decision making.

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The next generation of sensor monitoring systems promises to finally deliver the sophistication and usability the industry has been crying out for.

ViZix is in every respect, the sophisticated, flexible and agile system which promises to deliver a significantly enhanced experience to its users.

THE OIL and gas industry is becoming more ambitious – both in terms of where it is going to extract oil and how it is doing so. In turn, this is making the process more risky, expensive and challenging. In order to ensure the offshore oil industry can continue to operate in a commercially sustainable manner, while also meeting increasingly tough environmental obligations, it needs processes which are more sophisticated, cheaper to run and effective. Many of these goals are being met by the adoption of advanced sensor and data monitoring systems, which help improve safety and efficiency across a platform’s operation.

Evolving Technologies

The offshore industry is constantly in a state of evolution. The business is becoming more demanding, challenging and expensive, as oil becomes harder to locate and extract. Profit margins are being squeezed and regulatory oversight places further demands on the performance of offshore platforms. As the challenges grow, though, the technology becomes increasingly sophisticated to meet the industry’s changing needs.

The offshore industry has long deployed sensors across the operation. These can perform jobs such as detecting leaks, monitoring flows, assessing the condition of infrastructure and much more. In the past, such sensors have been cumbersome, expensive and difficult to install. However, the technology is now moving in a more positive direction. Individual sensors are becoming smaller, lighter, cheaper and more effective. Increasingly powerful computers and the advent of wireless sensor networks have increased massively the amount and range of data operators can gather.

Furthermore, a more proactive attitude to data analysis is seeing operators seek increased information about all aspects of the business. This includes the position of workers on board the platform, football tracking and supply chain management, which can provide an overview of an item’s location at every stage of the supply chain. The new stock phrase is the internet of things (IoT) – the ability to integrate sensing, communications and analytical functionalities all into the same box. However, until now, many of the existing technologies have been unable to cope.

Many existing IoT technologies struggle to process quickly multiple high speed sensor streams. This is a problem for the offshore oil and gas industry where vast quantities of data are flying in from multiple angles in real time. Information can date quickly, so operators need as accurate as possible a view of what’s happening across the operation.

These technologies are also costly to implement and relatively cumbersome. Increasingly, the amount of data the industry is harvesting is beginning to outstrip operators’ abilities to process it. In order to fully capitalize on available data sets, operators need the capability to view and analyze a wide range of data in real time.

The drive is on to integrate data from numerous sources in a smooth and intuitive way. This has to be presented all in one place to a single operator who is then able to comprehend and act upon all the data as quickly as possible. Any delay can result in issues being missed and a reduction in the overall efficiency of the operation.

New Developments

A new generation of technologies is now coming to market, which aims to solve this problem. A prime example is ViZix from one of the pioneers in business intelligence systems, Mojix Inc. Their RFID systems have long been used by the industry to provide enhanced visibility over the supply chain. For example, BP already uses Mojix’s RFID technology to provide track and trace capabilities to its Clair Ridge platform in the North Sea. This allows the company to instantly monitor their supply chain by checking the location of separate items. In so doing, they can better co-ordinate the entire supply chain, minimizing delivery costs and wastage.

This is now being supplemented by ViZix business intelligence software. ViZix is aimed at industries which need to integrate multiple sets of sensor data into one place. It is designed to be compact, simple to install and to have the flexibility to function with a range of different sensor inputs. It offers high speed sensor fusion and aggregation across the platform, real time event processing allowing business metrics to be viewed instantly and an advanced IoT visualization system which yields a rich visual control of connected things.

Tom Cropper, Editor

ViZix is in every respect, the sophisticated, flexible and agile system which promises to deliver a significantly enhanced experience to its users.
Converging Technologies Make for an Exciting Future

Tom Cropper, Editor

As sensors become more affordable, effective and connected, the oil industry is experiencing a revolution in data management – one which can be critical for the future.

Predicting the future is almost impossible – especially in the oil and gas market. Over the past few years the only consistency in predictions has been their ability to shoot wide of the mark. Nevertheless, in planning for future technology, oil and gas operators must attempt to do just that. Identifying the future shape of the market will play an important role in determining what direction new capabilities grow.

The Future Market
A major factor in the future is where oil prices will travel. There is no clear indication. The Chinese stock market crash in June prompted fears that the world’s fastest growing economy would grow at a relatively sluggish pace, dampening demand. This, coupled with stagnating growth in another Tiger economy, Brazil, is expected by some to ensure global oil demand remains sluggish.

Even so, the US Energy Information Administration’s latest forecast for demand in 2016 has grown slightly. It suggests demand will rise by 270,000 bpd in 2016 to 95.2 million bpd. That’s an increase of 0.3% on September’s figure. The change is prompted in part by expectations that China’s growth will be stronger in 2016 than previously thought. At the same time, the surge in US shale is expected to tail off. The report suggests that growth in non-Saudi oil is expected to be minimal.

Michael Wittner, an analyst at Société Générale in New York, suggested Saudi Arabia’s strategy of keeping production high in order to force non-OPEC producers to cut output had been successful. He said that the world’s crude oil market could increase from 91.4 million barrels per day in 2015 to 94.8 million this year. “The increase in global crude production will be led by the United States,” he said. Yet the market is in a fluid and volatile market. The only certainty is uncertainty. Analysts’ predictions for future oil prices range from the optimistic who suggest prices will bounce back to their plus $100 days to the most pessimistic which suggest drops to less than $40. Most split the difference and suggest the industry should expect to cope in an environment of $70 per barrel. Writing in the Daily Telegraph, Liam Halligan concludes that “only a fool or a liar” would attempt to predict the future of the oil price, before attempting to do just that. He goes on to say that he believes the current price is under-valued.

Conversely, Goldman Sachs has warned that $20 a barrel could happen with over-supply becoming worse once sanctions on Iran are lifted. So, when you have one analyst predicting a surge in prices while others predict another crash, the only sure thing is that a year from now at least one of them is likely to look foolish.

In gearing up for the future, the oil and gas companies must prepare for a worst case scenario. That means finding a way to improve efficiency to the level at which a price of $20 or $30 per barrel can be considered commercially viable. At first glance, given the complexity of the industry, this appears impossible.

Technologies of the Future
The only real way to achieve this is to invest now. The next generation of sensor network technology promises much. The market has been developing quickly over the last few years, and now looks like it has the potential to take off. The cost of sensors is coming down rapidly, while the amount of information recovered by operations continues to increase exponentially. The more it does, the more operators are able to drive significant improvements into their businesses.

A key development is the introduction of wireless sensor networks. Wired sensor systems have expanded over recent years as the cost of implementation has decreased. The emergence of micro machining technology has created smaller sensors with lower power demands and higher capabilities. Even so, the cost of installing a wired system remains prohibitively high. A report on Plantengineering.com suggests wired sensors can cost 25 to 30 times the amount of an accelerometer or an offshore installation. Wireless sensor networks can reduce that cost, while also ensuring a more reliable connection and increased data processing capacity.

All this technology feeds into the Digital Oilfield concept. This is a vision of greater automation, connectivity and information flow across the oil field. In 2006, Shell introduced its Smart Fields based project around this concept. In the future it expects to drive towards fiber optic wells and more advanced well monitoring techniques. BP is operating on a similar level. Its Oil Field of the Future program seeks to improve instant decision making through advanced, real time data gathering capabilities. When launching the program in 2010, BP predicted it would help increase production by 100,000 barrels per day.

However, there are challenges. Wireless networks come with an additional data risk. Malicious nodes can disrupt the flow of information and the integrity of data. A report into the use of wireless network sensors in the Niger Delta outlines the considerable investment devoted by companies into security of their wireless network solutions.

Managing the flow of data will also be a major obstacle. The amount of information processed by offshore oil and gas companies is predicted to double within the next two years. The biggest challenge will be to use it. For this, a new generation of analytic software is coming to market, which enables operators to bring together multiple data sets telling multiple stories from many different sources. The aim of this data is to present this information in real time, allowing operators to make instant decisions. For example, it can help them rotate machinery by spotting deterioration in condition before a major failure occurs. It can detect minor leaks, improving productivity while reducing the carbon footprint. It does all this while presenting the data in a clear and easy to understand way which can be accessed by all staff with minimal IT training.

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The only real way to achieve this is to invest now. The next generation of sensor network technology promises much. The market has been developing quickly over the last few years, and now looks like it has the potential to take off. The cost of sensors is coming down rapidly, while the amount of information recovered by operations increases exponentially. The more it does, the more operators are able to drive significant improvements into their businesses.

A key development is the introduction of wireless sensor networks. Wired sensor systems have expanded over recent years as the cost of implementation has decreased. The emergence of micro machining technology has created smaller sensors with lower power demands and higher capabilities. Even so, the cost of installing a wired system remains prohibitively high. A report on Plantengineering.com suggests wired sensors can cost 25 to 30 times the amount of an accelerometer or an offshore installation. Wireless sensor networks can reduce that cost, while also ensuring a more reliable connection and increased data processing capacity.

All this technology feeds into the Digital Oilfield concept. This is a vision of greater automation, connectivity and information flow across the oil field. In 2006, Shell introduced its Smart Fields based project around this concept. In the future it expects to drive towards fiber optic wells and more advanced well monitoring techniques. BP is operating on a similar level. Its Oil Field of the Future program seeks to improve instant decision making through advanced, real time data gathering capabilities. When launching the program in 2010, BP predicted it would help increase production by 100,000 barrels per day.

However, there are challenges. Wireless networks come with an additional data risk. Malicious nodes can disrupt the flow of information and the integrity of data. A report into the use of wireless network sensors in the Niger Delta outlines the considerable investment devoted by companies into security of their wireless network solutions.

Managing the flow of data will also be a major obstacle. The amount of information processed by offshore oil and gas companies is predicted to double within the next two years. The biggest challenge will be to use it. For this, a new generation of analytic software is coming to market, which enables operators to bring together multiple data sets telling multiple stories from many different sources. The aim of this data is to present this information in real time, allowing operators to make instant decisions. For example, it can help them rotate machinery by spotting deterioration in condition before a major failure occurs. It can detect minor leaks, improving productivity while reducing the carbon footprint. It does all this while presenting the data in a clear and easy to understand way which can be accessed by all staff with minimal IT training.

By taking advantage of greater connectivity throughout the organization, this information can be shared between professionals in different locations around the world. In so doing, companies can significantly expand the decision-making resource to incorporate trained experts located away from the rig.

No one should underestimate the scale of the task confronting the industry. It is being asked to maintain increasingly complex and sophisticated hardware in a more stringent regulatory environment. Safety and environmental performance must be paramount. At the same time, commercial pressures mean they constantly have to do more with less – in other words, productivity and performance must improve while costs are kept under control. It’s a difficult ask, but sensor network technology can go a long way to providing a solution.

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